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ABSTRACT

To identify a set of predictor variables for student grades in a first-quarter English course, a study was undertaken of students' reading and language scores on the Career Planning Program (CPP) and the Multiple Assessment and Program Services (MAPS) placement tests. In addition, the relationship was examined between the first-quarter English course grades and students' age, gender, and race. The CPP and the MAPS were administered to all students at a metropolitan two-year college prior to the first day of classes in the four quarters of 1989. In addition, reading and language subtests were administered on the first day of classes to 104 students enrolled in entry-level English course. Study findings, based on an analysis of student course grades, standardized test scores, and demographic variables, included the following: (1) the mean age of the sample was 26 years old, 63.5% were male, and 95.2% were white; (2) age and the MAPS reading and language scores were found to be statistically significant in predicting students' grades; (3) CPP reading and language scores, gender, and race were not found to be statistically significant; (4) a significant positive relationship was found between all of the subtests; and (5) while age was found to have a significant relationship with the two MAPS subtests, it showed no relationship with the two CPP subtests. (BCY)

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A STUDY IN PREDICTING ENGLISH GRADES FOR FIRST-TIME-IN-COLLEGE STUDENTS USING THE CAREER PLANNING PROGRAM (CPP) AND MULTIPLE ASSESSMENT AND PROGRAM SERVICES (MAPS) READING AND LANGUAGE SCORES, AGE, GENDER, AND RACE

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A STUDY IN PREDICTING ENGLISH GRADES IN A TWO-YEAR TECHNICAL INSTITUTE USING THE CAREER PLANNING PROGRAM (CPP) AND MULTIPLE ASSESSMENT AND PROGRAM SERVICES (MAPS) READING AND LANGUAGE SCORES, AGE, GENDER, AND RACE

The Problem

Corporate America has often complained that higher education institutions do not address employment needs when identifying student outcomes and establishing program requirements. As business and industry move to a more global economy, more and better skilled workers are needed in a world marketplace. Along with these new trends in employment and improved employment skills, educational institutions and systems are paying close attention to employment demands on education in the 1990s.

Employment predictions indicate that business and industry will require employees of the 1990s to be trained in more technical and service oriented skills. These skills will be needed to compete in industries which are moving from agricultural and manufacturing jobs to more self-motivated, technical, and service-oriented jobs. Services such as health care, hotels, and restaurants hold a large portion of the jobs of the next decade along with business and finance, legal services, and retail trade ("Trend Toward Work," 1991). In April of 1991, President Bush unveiled his ambitious strategy to revamp the American education system to address the increasing global nature

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of the world's economy. In a booklet entitled "America 2000: An Education Strategy," the President's plan reports that large sums are spent for remedial training and that companies export skilled work or many times abandon projects because skilled workers are not qualified. The President's plan would establish new world standards for student achievement, encourage employers to consider results from the new American Achievement Test (modeled on the high school Advanced Placement Test) in hiring, and encourage postsecondary education institutions to use these same results in student admissions. The plan also suggests that business and labor set job-related skill standards for which master certification can be given.

Many technical and community colleges are investing time and money into determining the new and expanding jobs of the next century. They are revising or developing programs to train or retrain students in new and redefined skills in order to provide competently skilled graduates trained with skills which the job market demands. The efficiency with which colleges can recruit and train students for employment depends largely upon their ability to place students into a program of study with as little remediation and developmental training as possible. Even colleges requiring standards for admission admit students who need developmental assistance. Some institutions have a more selective admission criteria which reduces the number of students admitted who are not ready to begin regular college work. However, technical and community colleges have missions which

include the initial training and retraining of students and, therefore, cannot admit students according to the selective ivy-league criteria (Abraham, 1986). These colleges need criteria by which they can identify applicants' skills and other attributes which would help place them in a degree-credit college course. This common scenario reemphasizes the importance of selecting an accurate placement test and establishing criteria or a formula with such variables as can help place students into appropriate courses of study.

Although scores on many different standardized tests have always been considered in admissions processes, their predictive role will become more important as the jobs of the 1990s require more effective training in communications for a decreasing number of jobs. In September 1991, The Olsten Corporation released "Skills for Success: Training and Development the Workforce of the 1990s" in which it reported the results of its survey of human resource directors of 455 businesses. The purpose of the survey was to determine the primary skills that their employees need ("Temp Group," 1991). Of the employees' skills which needed enhancement, 65% of the companies cited written communications, and 62% cited interpersonal communication. Forty-nine percent of these same companies indicated that interpersonal communication was their most frequent training topic, yet only 27% of these companies test for writing skills during pre-employment screening. Nearly 70% of these businesses reimburse employees for taking courses which are job-related from educational

institutions; 60% reimburse for degree programs which are job related.

A new report on twenty-year academic trends by the Education Department in Washington D.C. indicates that small strides have been made in student performance in math and science. The report states, however, that "U.S. students' verbal skills are eroding dangerously" ("NAEP Trends," 1992, p. 5). The student's ability to perform in basic academics is especially important to vocational educators who are integrating these basic skills with job-specific skills in preparing students for a competitive workforce ("Trend Toward Work," 1991). Admissions directors and counselors in two-year colleges are concerned about their practices of predicting first-time-in-college students' grades for their appropriate placement into a program. With approximately half of all first-time applicants to college being placed in one or more remedial or developmental courses, colleges function as developmental centers as much as institutions of higher education (Einspruch, 1990; Hooper, 1987; New Jersey, 1988; Tennessee State Board of Regents, in press). Since more than 80% of four-year public colleges and 96% of four-year private colleges consider standardized testing important to admitting students, standardized testing for appropriate placement into two-year programs takes on new importance in light of the imminent need of these skilled professionals (Amberg, 1982).

Significance of this Study

Although the American College Test (ACT) and the Scholastic Aptitude Test (SAT) have long been the placement tests of choice by colleges and universities for predicting grades and determining placement for applicants, there has been a twenty-five year decline in student performance on these tests nationally. The class of 1991 had the worst performance ever on the SAT's verbal section (White, 1991). Dr. Johnny Tolliver, English Department Chairperson at Norfolk State University and head of the National Council of Teachers of English Panel on Testing, said that the SAT is an "outdated, multiple-choice test that fails to truly gauge what students know and how they can read and write" (White, 1991, p. A4). A new emphasis is being given to placement tests which have been developed for institutions offering a two-year degree and providing the types of technical programs and training to meet the needs of business and industry. In the last two decades, both The American College Testing Program and the College Board have promoted their technical, career-oriented placement tests which they developed for the technical and community colleges.

Few states, boards of regents, or governing boards specify the standardized test for institutions to use for placing first-time-in-college applicants into a program of study. The selection of the testing instruments is generally a consensus of the member institutions, the individual institution, or, all too often, the institution's admissions division and/or testing

counselor. The Career Planning Program (CPP) by American College Testing and the Multiple Assessment and Program Services (MAPS) tests by the College Board have verified their validity tests in their technical manuals; however, there is no published record of any institution conducting a study of both tests using the same sample population.

In an attempt to make their placement criteria more uniform, Florida's legislature in 1984 required all first-time-in-college students to take one of the following four standardized tests: American College Testing Program (ACT), American College Testing Program Assessment of Student Skills for Entry and Transfer (ASSET), College Board Multiple Assessment Programs and Services (MAPS), and College Board Scholastic Aptitude Test (SAT) (Postsecondary Education Act, 1985). No published studies, however, described the predictive results of any of the tests or suggested why these particular four tests were chosen. In 1990, Georgia's Department of Technical and Adult Education abandoned the recommended CPP test and required four descriptive MAPS tests as a placement test. No formal study was conducted as to the predictive validity of the test in any local population; the MAPS series of tests was selected by a committee which represented the more than thirty technical institutions in the state. New Jersey (New Jersey Basic Skills Council [NJBSC], 1988) worked with the College Board to create its own specialized placement test from the MAPS format, the New Jersey Adult Basic Education Test.

Although no published study has used scores of the CPP test and the MAPS test on the same population to predict English course grades for first-time-in-college students, other tests have been analyzed during a process for selecting an appropriate admissions test. In 1986, Arizona's Maricopa County completed a study using MAPS and the ASSET with inconclusive results (Abbott, 1986). Additionally, this study is unique by including the attributes variables of age, gender, and race to the standardized test scores. This analyzed the contribution of demographic variables in predicting course grades and their potential role in the development of a set of predictors to assist in academic placement of students into a first-quarter English class. The need for testing the CPP and MAPS subtests on the same populations to identify a set of predictors along with the influences of age, gender, and race prompted this study.

Statement of the Problem

This study focused on the results of testing the population with the CPP and MAPS Reading and Language subtests. Additionally, it looked at the relationships between (1) the independent variables and the criterion variable (English course grade), (2) the students' attribute variables and the criterion variable, and (3) the relationship among all of the variables. The purpose of this study was to answer the primary question:

(1) What is the best set of predictors of students' grades in a first-quarter English course, given the independent variables of CPP Reading and Language scores, MAPS Reading and language scores, age, race, and gender?

Secondarily, the following questions were examined:

(2) Is there a significant relationship between first-quarter English course grades and Language scores on the CPP test?

(3) Is there a significant relationship between first-quarter English course grades and Reading scores on the CPP test?

(4) Is there a significant relationship between first-quarter English course grades and Language scores on the MAPS test?

(5) Is there a significant relationship between first-quarter English course grades and Reading scores on the MAPS test?

Several related questions were also investigated:

(6) Is there a significant relationship between first-quarter English course grades and the student's age?

(7) Is there a significant relationship between first-quarter English course grades and the student's gender?

(8) Is there a significant relationship between first-quarter English course grades and the student's race?

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Definition of Terms

The following terms are defined here as they are interpreted in this study:

(1) Age--the age of the student at the completion of the English course.

(2) CPP scores--scores reported in stanines which range from a low of one to a high of nine and indicate the student's probable chance of achieving a C average or higher. Only the Reading and Language subtests of the CPP test bank were administered.

(3) Entry-level English course--the first English course within the curriculum's required humanities classes for students accepted into the program.

(4) Gender--student classification as male or female.

(5) MAPS scores--percentile ranking of students' scores which are reported as a raw number score and must be correlated to population capability in order to establish cut-off scores for determining the student's probable chance of achieving a C average or higher. Form C of the Descriptive Tests for Reading and Language were administered.

(6) Postsecondary--formal instructional programs designed primarily for high school graduates or the equivalent. The National Center for Education Research Statistics includes: academic, vocational, and continuing

professional education programs and excludes avocational and adult basic education programs.

(7) Race--the racial group with which the students identify: (1) White (2) Other.

Summary

During the next fifteen years, the nature of postsecondary training is expected to make radical changes. Business and industry are predicting that manufacturing will decrease, whereas technical and service jobs will increase. These types of jobs will require more self-motivated, technically proficient employees who have strong communication skills. The most likely and most cost efficient places to meet the training needs of the community are the local, technical and community colleges which will need to modify their programs to meet the global and local needs of business and industry. With the flood of older, already-employed students returning for retraining in the faster changing technologies, colleges are looking for ways to predict student grades to help in placing these students into training courses or programs of study. Admissions directors and counselors are using standardized test scores to predict course grades and to identify remedial and developmental study needs, but they are also looking for other predictors which can make the training/ retraining process more efficient and/or effective.

The profile of the typical college student is changing. As more and more veterans of business and industry return to the college campus to retrain for new positions, the age of the

traditional college student will continue to rise. Also, the drastic increase of women in technical and management positions over the last twenty years has increased the percentage of females on the college campus. Additionally, the American White population growth has slowed, but the Non-white population growth has jumped and continues to increase, changing the average college student profile to one closer to what was previously called the non-traditional student. This study was conducted to identify a set of variables that could predict students' grades in a first-quarter English course in an effort to assist in placing students into courses or programs of study. CPP and MAPS scores for Reading and Language were included along with the age, gender, and race of the students. These identified predictors of students' grades can assist counselors in advising students toward individual courses or any program within the curriculum.

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Review of Related Literature

Investigating the predictability of standardized test scores is a normal validity procedure. A standard procedure for many technical and community colleges is to conduct localized testing to delineate a set of predictors of course grades. The literature for the two standardized tests included in this study is available and describes the validity for each of the tests. The importance of including these two tests in this study was related to the current state of the United States' education system and its relationship to the constantly changing employment situation. With the predicted changes in the nation's population and work force during the next decade, tests like these will play a significant role in the accurate and expeditious placement of applicants to college programs. The attribute variables (age, gender, and race) were included because these are three variables of the future workforce which will make it different from today's employees. Their inclusion in this analysis will help to determine if they are predictors to aid in advisement and the current placement processes.

Need for Technical and Community College Training

As the calendar turned to the decade of the 1990s, the focus of American government, business and industry, and education turned to the United States' current low position in the world marketplace and its decline in the global economy. In the last three decades that the United States government has regulated big businesses, business and industry have developed their own

systems of internal training for skills that the American education system did not supply. As these same businesses look to more deregulation from the government and their own dim future in a competitive world marketplace, they see an urgent need to improve the skills of the average American worker. In an attempt to stop the decline in skill productivity and wages of the American workforce, the National Center on Education and the Economy ("High Skills," 1990) recommends that a high national standard of educational performance be required of all students by age sixteen. On the state level, John Foster, Georgia Senate Education Chairman, proposed that high schools should warranty the graduates of their college-preparation courses (White, 1992a). Mr. Foster explains that the high schools would then give free remediation to students who are unprepared so that they will not have to pay college tuition to take remedial or developmental courses.

As the Bureau of Labor Statistics identified the fastest growing jobs of the 1990s, none of the ten required a college degree (Unger, 1990). The New York Times reported that there are more college degree holders than there are jobs requiring a degree ("Competition from College Grads," 1990). Less than one in every four jobs requires a college degree. Most do, however, require basic skills, and the jobs of the future will require specialized skills in addition to basic communication and interpersonal skills. These skills will, however, become more important to technical and community colleges as college

graduates and experienced employees compete for technical jobs in a labor market that requires constant retraining but demands strong communication skills.

During the years that manufacturing was America's largest employer and accounted for its financial success, the American worker was required to use mostly physical skills. Those skills have been replaced by machines. The cash-dispensing automatic tellers now require bank employees to process loan applications. The robot-operated assembly plants now require manufacturing employees to trouble-shoot problems or have defined technical skills. A few specific examples are readily available. In 1987, the New York Telephone Company's subsidiary of NYNEX Corporation tested 57,000 people before it could find 2,100 qualified to be operators and repair technicians; 83% of job applicants are not considered because of their poor reading, math, and motivational skills; and a 1991 survey of 4,000 companies announced that high school graduates are not ready to work, "lacking the motivation and-or general skills needed to be productive employees" ("School Partnerships," 1991, p. 2). American businesses are distressed at public education's failure to prepare a workforce to perform jobs of the 1990s.

The changes in entry-level duties now require workers to read, reason, and write. Most have to follow written instructions and be able to explain their ideas to their colleagues. Some companies, like Motorola, teach application courses in math and reading because public schools are no longer

meeting their needs. The Olsten Corporation ("Temp Group," 1991), third largest employer of temporary employees in the United States, promotes work place literacy skills of writing and speaking and are screening more strictly to employ people with these skills. Companies are not alone in recognizing the need to change the direction of education. In the August 1990 Roper Poll, 75% of those polled agreed with business that public schools fail to prepare students for jobs in the workforce, and 63% think these schools will not adequately prepare students for future jobs requiring more technical skills ("Seventy-five," 1990).

The Labor Secretary's Commission on Achieving Necessary Skills (SCANS) emphasizes that contextual learning skills are important in preparing students for the work place ("Schools Must," 1991). In a SCANS report to Secretary of Labor Lynn Martin, former Labor Secretary Bill Brock said, "More than half our young people leave school without the knowledge or foundation required to find and hold a good job" ("SCANS report," 1991, p. 2). In the report, Brock identified a three part foundation of skills: Basic Skills (reading, writing, and computation), Thinking Skills (learning, reasoning, and problem-solving), and Personal Qualities (responsibility, values, and sociability). Although the White House has adopted the SCANS report as part of its effort to renew American education, it is only a hope that employers and educators will accept their challenge.

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Role of Technical and Community College Training

The National Center for Education Statistics (NCES) estimated the total enrollment at all postsecondary institutions in the United States in the fall of 1990 to be 14.9 million students (National Center for Education Statistics, March 1991). Many of these students are returning to college for specific skills training rather than a degree. Although the total number of degrees conferred in 1989-90 did not rise significantly, the enrollment increased by about three percent over the fall enrollment of 1988-89. Older students returning to college contributed to this increase and, at the same time, raised the average age of students attending most campuses.

The technical and community colleges have seen the greatest increase in enrollments in recent years for some very good reasons. First, the cost to attend a two-year institution is less than a baccalaureate college or university. During the decade of the 1980s, four-year college in-state tuition and fees increased by 128% ("Research Brief," 1991). In 1980, technical and community college tuition was one-third of the cost of a four-year institution and increased by only 95% during the 1980s; higher education is still a bargain, especially at the community, technical, and junior colleges ("Research Brief," 1991). Second, the curriculum offers more skills training designed for the employed individuals who want to upgrade their skills, train for position change or promotion, or retrain for a new vocational career. As technology changes, as the role of business and

industry changes, and as the skills level required of the nation's workforce changes, technical and community colleges will need to change their curriculum in order to provide the appropriate skills training sought by applicants to their institutions.

Of all of the undergraduate students enrolled in postsecondary institutions in 1989, 35% had a vocational education major, accounting for 78% of the enrollment in institutions offering less than a baccalaureate; community colleges accounted for 62% of this enrollment, public technical institutes, 23%, and proprietary schools, 15% (Lewis, 1989). The trend is that the two-year institutions will experience a continued growth because they play a vital role in supplying skilled employees to meet the increasing number of skilled jobs. In the next decade, ever-changing technology will make retraining programs a thriving business for postsecondary institutions which strategically plan their programs, have a good procedure for testing to screen out possible incompletes or withdrawals, and develop a good counseling process to promote student achievement (Clemence & Brinks, 1978).

Business and Population Shifts

During the next fifteen years, businesses will continue to change in size, product, and location. Forecasters constantly study the trends in business changes in an attempt to supply the desired environment and quality of workers required to successfully operate the new and changing businesses. Across the

United States, counties, cities, and states employ such prognosticators for long-range planning in an attempt to attract new businesses and the economic boost they bring to the local economy.

Some of these changes bring with them shifts in businesses and populations that impact each community's ability to support additional business and industry. In his study ranking metropolitan counties by population and income growth with land density, G. Scott Thomas (1991) identified the areas which created success for businesses during the decade of the 1980s. Forty of the hottest fifty metropolitan counties were in the South; ten of these forty counties were in the metropolitan Atlanta area. As these counties continue to grow during the 1990s, Thomas concludes that their economic future "will depend on attracting more jobs, and the prospects for this are good" (Thomas, 1991, p. 37).

The makeup of the populations in these growth areas can determine their future business growth potential. For example, baby boomers were drawn to the Orlando, Fort Worth, and Atlanta metro areas during the 1980s. Being a baby boomer magnet is important to any metropolitan area because this group is the "most economically powerful generation in the U.S., and they will remain so until they are too old to cash their own Social Security checks" (Frey, 1992, p. 36). The younger boomers (born between 1956 and 1965) and the black boomers are drawn to the sunbelt. The older boomers (born between 1946 and 1955) have

already moved from the city to the suburbs; only one southern city was a magnet for older boomers during the 1980s--Atlanta (Frey, 1992). With the younger and black boomers making up the majority of the movement to the South, the types of housing, training, and jobs are impacted.

Married couples are very important to the economy of any area because of their impact on the community tax base and the area birthrate. Married couples have the highest median income of all household types: "33.8% above the median for all households in 1989" (Francese, 1991, p. 2). The United States experienced a 4.8% growth in the number of married couples during the decade of the 1980s. All of the growth took place in the South and West. According to the National Census Bureau, the number of married couples decreased in the Northeast and Midwest, but the South increased by 8.8% and the West by 13.9% (Francese, 1991).

The prognosticators who are planning the training and educational requirements for the 1990s must consider the changing population, changing jobs, and the speed with which both of these will occur.

Admissions and Placement Testing

Changes in the types of jobs emerging during the next fifteen years will require more technically proficient employees who have strong communication skills. In order to offer the training programs that business and industry will need to train or retrain the local workforce, technical and community colleges

must address the assessment of older, already-employed students who are returning to school for retraining. Most of their training needs will be additional skills required to meet the changes in their job description or to improve their job performance. In any and all cases, colleges are looking for ways to assess student capabilities and to predict student grades to help in placing students into training courses or programs of study appropriate for their potential performance. Admissions directors and counselors are using standardized test scores to predict course grades and to identify remedial and developmental study needs, but they are also looking for other predictors which can make the training/retraining process more efficient and/or effective.

The two standardized tests used in this study were the Career Planning Program (CPP) test and the Multiple Assessment and Program Services (MAPS) test. Since the emphasis of this study was to identify predictors of student English grades, the Reading and Language subtests of each testing program were used. A review of these two standardized tests follows.

Career Planning Program (CPP)

The Career Planning Program is a widely used career and educational planning test. Developed by the American College Testing Program, the CPP tests were constructed and normed for students planning to enter a community college or a technical training program (Healy, 1973). The test reports eight interest scores (business contact, business detail, trade, technical,

science, health, creative arts, and social services) and seven experience scores (same as interest scores, excluding health). Students use this information about themselves (including aptitudes, interests, self-reported competencies, values, and grades) to make program choices or career plans. The test also reports six ability scores (mechanical reasoning, numerical skills, space relations, reading skills, language usage, and clerical skills) to help students further determine if their abilities are sufficient to succeed in a particular occupational field of study (Mitchell, 1983). These 21 scores are reported either as a career clusters or in an educational planning summary. The Career Planning Program uses the data information conversion technique to interpret the test scores in order to give students an understandable interpretation of both their job interests and their academic abilities. Instead of using raw scores or percentile scores, CPP uses descriptive terms or stanines to indicate the students' probable chances of achieving a C or higher average. Using the students' own information, the eight career clusters report student interest as high, medium, or low. For example, job interests are composites of the students' information and report to the students that they have a high, medium, or low interest in a particular occupation. The educational planning summary reports the students' ability scores on a stanine scale from one to nine. It is these scores that give the institution a counseling tool for placing the students

into programs which interest them and in which they have the abilities to make passing grades (Hanson & Cole, 1972).

The Career Planning Program's reliability data suggest that measurement of the eight abilities are moderately reliable. Based on a sample population of 92 students, CPP reports that the KR-20 reliability estimates for the first five ability scales range from .82 to .88. Test-retest reliability is presented on the other three scales based on a sample of 314 students (Healy, 1973; Buros, 1978). The reliability data which CPP provided are limited (Healy, 1973).

The Career Planning Program offers all three types of validity data for its Reading and Language subtests: content, concurrent, and predictive. The content validity data given for the CPP indicate that "the tests were well constructed and are internally consistent" (Healy, 1973, p. 511). Correlations between CPP and the corresponding General Aptitude Test Battery (GATB) generally support the concurrent validity of the CPP scales (Buros, 1978). Although there is no strong endorsement of or current research into the CPP's predictive validity, CPP gives multiple correlations of the ability scales with grades in 19 training programs (mean $\underline{R}$ = .48). These regression equations are used as the basis to predict a student's chances of making a $\underline{C}$ or higher grade. Healy (1973) says that the multiple $\underline{R}$s "compare favorably with historical efforts to predict performance" in occupational and academic training (p. 511).

Multiple Assessment Programs and Services (MAPS)

The second standardized test included in this study was a remediation and placement test called the Multiple Assessment Programs and Services (MAPS) test. Tests in Print (Mitchell, 1983) offers the following description of the test:

> MAPS was designed to help colleges make decisions about placement levels and remediation needs of entering as well as continuing students. MAPS provides data in the assessment areas of remediation, placement, exemption, selection, instruction, guidance, and counseling. MAPS is composed of three biographical questionnaires and 60 tests which were derived from programs already in use. The programs listed are "Comparative Guidance and Placement Program, Descriptive Tests of Mathematics Skills, Instructional Admissions Testing Program, Institutional Test of Standard Written English, and Testing Academic Achievement." The MAPS program is administered by the College Board and Educational Testing Service (p. 266).

MAPS scores were developed to be used for placement and remediation needs rather than for admitting students to college (Mitchell, 1983). The general consensus among colleges is that MAPS should be used to assess the needs of first-time-in-college students and to use the test scores for placing students into appropriate levels of remedial, developmental, regular, or advanced courses (College Board, 1987).

The College Board (1980) consolidated a wide variety of placement tests (including the SAT) and questionnaires under the MAPS umbrella so that institutions can select the most appropriate test for them. Included under this umbrella is a set of descriptive tests of skills in reading, writing, computation, elementary algebra, and intermediate algebra which is designed for level I institutions such as community colleges and technical institutes. This set of descriptive skills tests is commonly referred to as the MAPS test. The Reading and Language subtests are used in this study.

In 1986, the College Board introduced the MAPS Placement Research Service which helps colleges use the different MAPS tests. Because the test results and criterion data are confidential, the validity data on MAPS is limited (Livingston, 1986). Although the College Board notes that most colleges are interested in such analyses as the relationship between students' preadmission test scores and their college course grades (The College Board, 1986), it conducted only one national validity study with course grades as the criterion variable. In this study, published in 1986, the subtests of reading, writing, and computation were used. The mean validity coefficient was a relatively low .26. In a 1985 study using the same subtests and with grade point average as the criterion variable, the mean validity coefficient was somewhat higher at .34. The four other published validity studies, which the College Board conducted nationally, tested the validity of Form A of the MAPS test to

Form B. The mean validity coefficient for these twelve subtests was a very high .87. The results of the College Board's validity studies support the use of the test as a pretest and posttest for remedial or developmental studies. The local institutions must, however, conduct their own data analysis to determine the cut-off scores for placing students into regular programs of study.

Demographic Variables

Although standardized tests are widely used to predict course grades or grade point averages, the attribute variables (age, gender, and race) of the technical and community college student body may have an impact on students' grades and an even greater impact over the next ten years (Grulick, 1986). According to a recent report in American Demographics, these variables of age, gender, and race will impact the nation's economy ("Baby Bust," 1992).

Age

The rise in the mean age of United States residents has some continuing effects on the U.S. economy as well as current and future employment demands. This aging of America will lessen the supply of youth workers and slow the "rate of household growth" ("Baby Bust," 1992, p. F3). At the same time, there is an increase in college enrollment and a decrease in the 18-24 year old population; thus, the average age of college students is older. A government survey released in November 1991 said that one in every four college students in 1989 was over twenty-nine years old (3.3 million); that's twice as many as were enrolled

fifteen years ago ("College Students," 1991). This shift in enrollment from the traditional to the more non-traditional students is occurring more rapidly on the two-year college campus than at the university level. More than half of the technical and community college students are older than the students at a traditional college or university, and more than 55% of all freshmen enrolling in higher education begin in a two-year institution (Hughes, 1991).

As the jobs of the 1990s require updated skills or new and constantly changing skills, American workers will be going back to school. These workers will not be looking for a degree or even a diploma but for the skills they need to continue their current job or to improve their employment. About fifty million workers in America's current workforce will need to be trained for new jobs in the 1990s; that is 42% of the current workforce ("Three Year ASTD," 1990). If the company paid for the training, it would cost them approximately fifteen billion dollars. That is half of the thirty billion dollars that business and industry currently spends annually on training.

The aging of America is having a heavy financial impact on business and industry, and they are looking for two-year postsecondary institutions that will offer the training which their employees need (to stay current in the industry) and which they cannot afford to deliver. According to the American Society for Training and Development, more than fifty million American workers will require skills training: basic skills (17 million),

new technology (16 million), customer service (11 million), and executive and supervisory (five million) ("ASTD Campaign," 1990).

Past studies have suggested that the age of the students has an impact on the grade they are awarded. Some contend that older students tend to have higher grades in college work while others suggest that older students are disadvantaged in taking college placement tests because of their unexercised test-taking skills (Aldag & Rose, 1983; Haywood & Hoffman, 1975). If researchers are unresolved about the effect of age on student performance, it is advantageous for researchers to include the age variable in prediction studies for situations which will include the older, nontraditional students. Age was included in this study to determine its relationship to the students' English grades.

Gender

Gender based bias has been a widely discussed local topic on which educators are beginning to actively collect data. The controversy continues over what educational and societal factors turn girls, who are generally more verbal and have more interpersonal skills, away from certain courses, programs, and professions (White, 1992b). The stigmas of American society which confine women to the less competitive jobs are changing as women become an annually higher percentage of the American workforce.

Many of the 3.3 million undergraduates over 30 years of age are women who are "retraining to take advantage of new job opportunities" ("College Students," 1991, p. 9A). Former Labor

Secretary Elizabeth Dole said, about her initiatives to get more women into the skilled trades, that "welfare roles would decrease as women become more self-sufficient" ("Women Need," 1991, p. 5). Women made up only 3.1% of American workers enrolled in apprenticeships in 1978; in 1990, they accounted for 7.1% ("Women Need," 1991). In 1991, both the House and Senate introduced bills to push women into nontraditional fields. The final bill authorizes $6 million for grants over four years to help states promote placing women in non-traditional, high-paying fields ("Congress Passes Bill," 1991).

Technical and community colleges seek to use the most reliable and predictive procedures in their admissions process. Most have selected the standardized tests which they profess helps them to avoid discrimination, including gender discrimination. Yet, many past studies have tried to determine if standardized tests are gender partial (Scott, Fenske, & Maxey, 1974; Gray, 1974). Gender was included in this study to determine its relationship to the students' English grades.

Race

Obtaining racial balance in education populations tied up the courts during the 1960s and 1970s. The 1980s brought with them an effort to identify other barriers to the fair treatment of all races. One of these areas was college placement testing (Looney, 1981). Race became an independent variable in prediction studies using standardized tests (Thurmond & Lewis,

1986). The 1990s, however, will see changes in the racial makeup of the American workforce and its economy.

A study released in September 1991 ("The Road to College: Educational Progress by Race and Ethnicity") reported that by 1995 one-third of students in the United States will be from minorities ("Study Says," 1991). Conducted by the College Board and the Western Interstate Commission for Higher Education, the study underscores the urgent need for effective dropout prevention programs and more financial aid programs throughout college. The current percentage of minority dropouts (Blacks, 5.1%; Hispanics, 8.1%) is more than twice that of Whites (3.4%) ("Dropout Demonstration," 1991). The unemployment rate is worse; the Labor Department, Bureau of Labor Statistics announced that the August 1990 unemployment rate in the United States was 5.6%; this rate was disproportionately higher for minority workers: 4.8% Whites, 11.7% Blacks, and 7.9% Hispanics ("News Briefs," 1991). Robin Etter Zuniga, the author of The College Board study, says that for the first time, "Officials can pinpoint the patterns of the increasingly multicultural student body and then make plans to better educate under served . . . racial and ethnic groups" ("Study Says," 1991, p. 9A).

The Bureau of Census projects for the 1990s that the proportion of Whites in the mean college age group, 25-34, will drop from 74% to 68% while Black, Hispanics, and Asians will increase 14%, 14%, and 5% respectively ("Sex, Race, and Ethnicity," 1990). If these projections are correct, an

increasing number of this nation's future work force will have less formal education and fewer employment skills and will probably have a lower standard of living. Additionally, it would be a normal assumption in light of these predictions that local technical and community colleges would be the logical place for individuals and businesses to turn to supply these needed employment skills. Greater pressure will be applied from the general public for an accurate and effective admissions/placement process in order to save time and money. Race was included in this study to determine if its effect is related to the students' English grades.

Summary

Colleges and universities will begin to offer skills training, retraining, and information classes in the 1990s. Clayton State College in Atlanta experienced growth of 10-15% in continuing education classes; according to Bryan Edwards, director of the college's continuing education program, the increase is due to "the rapid pace of technology" and the need of the existing workforce "to keep current with changes in society" (Trocheck, 1991, p. D4). At Emory University, Mary Cobb Bugg, director of Emory's Evening at Emory program, loaded the Emory schedule with "every kind of psychology or money class . . . to help people deal with what we think the economy's going to do to them" (Trocheck, 1991, p. D4). Technical and community college offerings include these types of courses as well as short term training programs which meet a macroenvironmental need.

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Indicators from business and industry describe America's dwindling role in the world-wide market because of poorly trained workers and low productivity, President Bush introduced his America 2000 education initiative which redirects the emphasis of education to basic skills, performance-based assessment, and skills training for a new and changing employment community (Callahan, 1992). Over the past two decades, the average American's productivity and earning power have decreased. In 1990, it was estimated to take three years to make the productivity gains that workers used to achieve in one year prior to 1973 ("Study Proposes," 1990). The economy continues to grow because 50% of the population is now working in comparison to 40% in 1973; that is why the real average weekly earnings have dropped by 12% and allowed twelve other nations to pay wages greater than the United States ("Study Proposes," 1990). Turning the American economy around will require a turn around in worker productivity which will, in turn, increase average weekly earnings. America 2000 plans to accomplish this economic task by training and retraining the American workforce through its educational institutions.

When the economy decreases the buying power of the general population or increases the percentage of unemployed citizens, people return to school to get the fastest employment training possible. The U.S. Education Department estimated that enrollment in public two-year colleges in the 1990-91 year alone jumped by eight percent, whereas public 4-year colleges had a one

percent enrollment increase (Reinhard, 1992). Although the average tuition charges for undergraduates at 2-year institutions has risen by 13% in one year (Reinhard, 1991), technical and community colleges are experiencing a surge in enrollment in continuing education classes which offer life skills (Trocheck, 1991). The 2-year college tuition is less than half of the average 4-year institution and remains the best educational bargain by a wide margin (Reinhard, 1991).

The 1991 enrollment increases at two-year institutions placed demands for specific training on these colleges at a time when their budgets were trimmed to meet the economic conditions. Resulting from the 1990-91 changes in the U.S. economy, unemployed and underemployed Americans returned to school along with the technically deficient and those training to enter the workforce for the first time. Adding to the burden of these two-year institutions, businesses are asking for assistance in training employees needing basic skills.

The radically changing technology, ethnic make-up, and employment requirements of the next five years will find many of these institutions unprepared for the demands which will be placed on them. Even if these colleges have completed their macro-analyses and are prepared to support the industry needs of local businesses, they must also have a process which discriminates by the applicants' abilities and which identifies other variables which will predict their achievement. If the colleges do not have appropriate procedures for testing and

admitting students into courses at which they are likely to succeed, admitting vast numbers of non-traditional students will be confusing and time consuming at its best and a hindrance to the training programs at its worst. This study was conducted to identify variables which could predict student performance and more efficiently place students into degree, diploma, or training programs.

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Research Methodology and Design

This study was designed for the purpose of identifying the best set of predictors of entry-level English course grades using the variables of students' scores on two standardized placement tests and basic demographic information. Data were collected on the following independent variables: CPP Reading and Language subtests, MAPS Reading and Language subtests, age, gender, and race. These data were analyzed using multiple regression analysis and Pearson correlations.

The subjects in this study were classified as admitted, non-provisional students and were also referred to as first-quarter students. These students enrolled for the first time in and achieved a grade in an entry-level English course; this grade was the dependent variable in the analysis. The students were enrolled in an institution where the programs of study are of a technical nature and where the highest degree is an associate degree.

The dependent variable was the grade the student received in the entry-level English course. During the one year (four academic quarters), the data were collected from all entry-level English courses. The sample population included only those students awarded a grade for their course. Withdrawals were excluded from the sample. Additionally, the influence of irregular attendance was controlled by the institution's attendance policy which requires students to attend 80% or more of the class sessions, complete all requirements for the course,

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and complete a final examination before a grade is awarded. According to the policy, students who are absent more than 20% of the classes are automatically dropped from the course. The drop forms originate with the instructors who record the absences.

Because these classes were taught by three different teachers during each quarter, the following steps were taken to ensure the evaluation of the students' performances were objective and consistent: (1) The instructors were qualified English Department faculty with a minimum of ten years of teaching experience, were instructed on the basics of this research project, and agreed to work with each other, and (2) for these classes, the instructors gave a written final exam, and they scored the exam according to the same criteria for a consensus grade.

Definitions of Dependent and Independent Variables

The following are operational definitions intended for the purposes of this study:

(1) Entry-level English course grade--the actual grade awarded students completing the course. The possible grades included, from highest to lowest, A, B, C, D, and F.

(2) Reading and Language subtest scores on the Career Placement Program Test--a stanine score ranging from a low of 1 to a high of 9.

(3) Reading and Language subtest scores on the Multiple Assessment and Placement Services Test--a percentile

rank ranging from 1 to 99. The percentile rankings in this study compared the raw scores of the sample population to those of 800 other students at 21 two-year and four-year colleges who took the same tests during the spring of 1988 (College Board, in press).

(4) Age--the age of the students on the last day of the quarter during which they completed the English course and received a grade.

(5) Gender--classification as male or female.

(6) Race--the racial group with which the students identify. For this study, the students were classified as either (1) White or (2) Non-white.

Research Questions

Admission requirements for four-year colleges and universities are often more strict or more strictly adhered to than the two-year institutions (Livingston, 1986). For example, to allow technical and community colleges to maintain an open admissions policy to all high school graduates, the Tennessee State Board of Regents (1988) exempted all but the six State Board of Regents universities from high school unit requirements for admission as a regular freshman in a degree program in the fall quarter 1989. These 1989 Admission Requirements go on to explain that those students entering two-year college programs of study designed for transfer to baccalaureate schools should meet the recommended unit requirements. S. A. Livingston (1986) of the Educational Testing Service, predicting this seemingly

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paradoxical situation and its admissions nightmares, says the two-year colleges admit students exhibiting a wide range of ability in reading, writing, and mathematical skills, and "they need to be placed in courses appropriate to their ability" (p. 2). Counselors have to deal with this wide variety of preparation for college courses in advising students for career choices and placing students into courses of study.

Using the counselor's only two sources of factual student information (test data and non-test data), R. J. Noeth (1976), a research psychologist with the American College Testing Program, says that counselors must convert both types of data into information that is meaningful and relevant for students; unfortunately, predictions of the everyday counselor are "often judgmental, nonstatistical guesstimates based on cursory examinations of available data, a method that is generally inaccurate" (p. 60). An aid to these counselors would be a set of accurate predictors which could assist them in placing students into appropriate courses based upon the students' acquired potential for achievement.

This study examined test data from two subtests of two prominent standardized assessment instruments as well as attribute variables of the sample population. The primary question addressed in this study was:

(1) What are the best predictors of students' grades in a first-quarter English course, given the independent

variables of CPP Reading and Language scores, MAPS Reading and language scores, age, race, and gender?

Secondarily, the following questions were examined:

(2) Is there a significant relationship between first-quarter English course grades and Language scores on the CPP test?

(3) Is there a significant relationship between first-quarter English course grades and Reading scores on the CPP test?

(4) Is there a significant relationship between first-quarter English course grades and Language scores on the MAPS test?

(5) Is there a significant relationship between first-quarter English course grades and Reading scores on the MAPS test?

Several related questions were also investigated:

(6) Is there a significant relationship between first-quarter English course grades and the student's age?

(7) Is there a significant relationship between first-quarter English course grades and the student's gender?

(8) Is there a significant relationship between first-quarter English course grades and the student's race?

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Research Design and Data Analysis

This study used Pearson product-moment correlations to examine the relationships among all of the variables. A step-wise multiple regression was used to identify the best predictors of student grades in an entry-level English class. All statistical functions used the .05 level of significance. Data were analyzed to determine a posteriori relationships.

Empirical Model

This study used the following empirical model to explore the relationships between the Reading and Language subtest scores on the CPP and MAPS subtests, age, gender, and race:

$$Grade=a + b_1(CPPREAD) + b_2(CPPLANG) + b_3(MAPSREAD) + b_4(MAPSLANG) + b_5(AGE) + b_6(GENDER) + b_7(RACE)$$

The variables used in this model are defined below. The criterion variable for this study was the course grade each of the students received in an entry-level English class. This is the measure of student performance for which the independent variables will be analyzed as predictors. The seven predictor variables in this model are:

(1) CPPREAD--the student stanine score received on the Reading subtest of the Career Placement Program Test,

(2) CPPLANG--the student stanine score received on the Language subtest of the Career Placement Program Test,

(3) MAPSREAD--the student percentile score received on the Reading subtest of the Multiple Assessment and Program Services test,

(4) MAPSLANG--the student percentile score received on the Language subtest of the Multiple Assessment and Program Services test,

(5) AGE--the age of the student on the last day of the course in which the English grade was received,

(6) GENDER--whether the student is male or female, and

(7) RACE--the ethnic group with which students identify. For this predictor variable, race will be grouped as White or Non-white.

The multiple general linear model was used to determine the strength of the independent variables in predicting the students' grades. A step-wise regression identified the relationships of the best predictors. This study discusses the resulting coefficients of determination and squared multiple correlation coefficients.

Sample

The sample consisted of 104 students enrolled in an entry-level English class at a metropolitan Atlanta, two-year technical college during 1989. The Career Placement Program test was administered to each student prior to the first day of classes as a part of the admissions process for students enrolling for each of the four quarters of the 1989 calendar year. During this four-quarter time frame, the College Board consented to allow Form C of the Multiple Assessment and Program Services test to be given to all applicants of the two-year institute. The Reading

and Language subtests were administered on the first day of classes for the entry-level English class.

With an enrollment of approximately 3,000 students, the college is the third largest of the eight technical institutes offering associate degrees in Georgia. Located in the metropolitan Atlanta area, the institution is situated in a suburban county with racial make-up of approximately 87% White, 6% Black, and 7% Other.

Summary

Student course grades, standardized test scores, and demographic variables were analyzed in this study. The predictor variables were student scores on CPP and MAPS Reading and Language subtests and student age, gender, and race. The collected data were statistically analyzed to identify the best predictors of entry-level English course grades, the criterion variable. The Pearson product-moment correlation was used to identify relationships between different variables. Using the multiple general linear regression model and step-wise regression analysis, predictors of student English grades were identified. The data were used for the purpose of aiding counselors in placing students into appropriate programs of study.

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Analysis of Data

This study focused on identifying which set of the following variables were the best predictors of students' entry-level English course grades: Language and Reading scores on the Career Planning Program (CPP) test, Language and Reading scores on the Multiple Assessment and Program Services (MAPS) test, age, gender, and race. Data were obtained on each of the 104 subjects in the sample population, analyzed, and used to answer the research questions.

Summary Statistics

Using the SYSTAT$_{TM}$ (Wilkinson, 1990) statistical software package, the measures obtained on the 104 students in the sample population were entered into a data file. Summary statistics were calculated for the subjects' age, gender, and race. The mean, variance, standard deviation, and sum of the variables were examined. The minimum and maximum numbers indicate the range of the numbers which represent these attribute variables in the statistics package.

Although the age of the subjects ranged from 17 to 51, the mean age was approximately 26 which is near the average age of the student population in the institution (29) and which falls into the non-traditional age group (25-34) for a two-year institution of higher education. Sixty-six of the subjects were male (63.5%), and 38 were female (36.5%). Race was coded as either Non-white (0) or White (1). Ninety-nine of the 104 subjects were White (95.2%), and 6 were Non-white (4.8%).

The institution's population reflects a more even male to female percentage ratio (52% to 48%). The institution has an ethnic affiliation of 94% White to 6% Non-white population which is reflective of the community in which the campus is located. Identifying predictors based on a variable which composes only 6% of the population would be inconclusive. Inferences drawn from the results would be weak at best.

Summary statistics were calculated also for the students' scores on the Career Planning Program (CPP) Language and Reading subtests and the Multiple Assessment and Program Services (MAPS) Language and Reading subtests. Results of these calculations are presented in Table 1. These statistics describe the students' achievement on the Language and Reading subtests of the CPP and MAPS standardized placement tests. The CPP subtests are scored by stanines which range from 1 to 9. Although student performance on the test extended almost the entire range of both tests, the mean scores for both Language (5.644) and Reading (5.904) subtests were between stanines five and six,

Table 1

Summary Statistics for Variables: The CPP Language Scores (CPPLANG), CPP Reading Scores (CPPREAD), MAPS Language Scores (MAPSLANG), and MAPS Reading Scores (MAPSREAD)

Measure of Variability	CPPLANG	CPPREAD	MAPSLANG	MAPSREAD
Minimum	1.000	2.000	1.000	3.000
Maximum	9.000	9.000	98.000	98.000
Range	8.000	7.000	97.000	95.000
Mean	5.604	5.904	40.712	53.462
Variance	2.173	2.457	786.052	807.727
SD	1.474	1.567	28.037	28.421
SUM	587.000	614.000	4234.000	5560.000

n = 104

which demonstrated a strong performance. The MAPS subtests are scored by percentile rankings which range from 1 to 99. Again, student performance on the tests extended almost the entire range of both subtests. The mean scores for Language and Reading were 40.712 and 53.462 respectively. Performance on both types of standardized tests indicated that these students scored higher on the reading portion of the test than on the language portion.

The criterion variable for this study was the grade awarded the students at the completion of the course. The five possible grades ranged from F to A and were coded into the statistics

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package from 1 to 5 respectively. Thus, a student receiving an F was given a 1, and a student receiving an A was given a 5. The mean grade for all subjects was 3.712 which converts to a high C.

Question 1

The primary question addressed in this study was:

(1) What is the best set of predictors of students' grades in a first-quarter English course, given the independent variables of CPP Reading and Language scores, MAPS Reading and Language scores, age, gender, and race?

The regression model included all of the independent variables. The criterion variable, GRADE, represented the grades awarded the subjects at the completion of an entry-level English course. The predictor variables were CPPLANG, scores on the Language subtest of the Career Planning Program Test; CPPREAD, scores on the Reading subtest of the Career Planning Program Test; MAPSLANG, scores on the Language subtest of the Multiple Assessment and Program Services Test; MAPSREAD, scores on the Reading subtest of the Multiple Assessment and Program Services Test; AGE, the age of the student on the last day of the course in which the English grade was received; GENDER, whether the student was male or female; and RACE, the ethnic group with which the students identified, White or Non-white.

These predictor variables were entered into a stepwise regression analysis to determine which variables were useful predictors of student grades. The statistics software SYSTAT

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(1990) sets the alpha to enter and remove at .150 to identify those predictors which should be examined further and to eliminate independent variables which may have no usefulness in view of the contributions of other independent variables in the model. Table 2 presents the results of this procedure including all seven independent variables.

Of these seven independent variables, the stepwise regression determined that the MAPS Reading scores (MAPSREAD), the age of the students (AGE), and the MAPS Language scores (MAPSLANG) made a significant contribution toward determining the students' grades in their entry-level English course. The remaining four independent variables were eliminated as significant predictors of the course grades.

Table 2

Summary of Regression Using Variables of CPPLANG, CPPREAD, MAPSLANG, MAPSREAD, AGE, GENDER, and RACE

N: 104 Square Multiple R: .289

Variable	Coefficient	STD Error	STD Coef	T	P(2Tail)
Constant	2.924	0.332	0.000	8.808	0.000
AGE	0.036	0.014	0.255	2.640	0.010
CPPLANG	-0.010	0.085	-0.012	-0.114	0.909
CPPREAD	0.028	0.085	0.037	0.329	0.743
MAPSLANG	0.009	0.005	0.214	1.756	0.082
MAPSREAD	0.007	0.005	0.162	1.313	0.192
RACE	0.110	0.488	0.020	0.225	0.822
GENDER	0.284	0.219	0.117	1.297	0.198

F-ratio = 5.941 P = 0.000

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According to the stepwise regression, the MAPS Reading scores accounted for 19.1% (R^2 = .191) of the variance in the English grades. Also, the age of the student, in combination with the MAPS Reading scores, accounted for an additional 6.8% of the course grade's variance (R^2 = .259). The MAPS Language scores, in combination with MAPSREAD and AGE, contributed an additional 3.0% to account for a total of 28.9% of the variance of the English grade.

Using the three predictor variables selected by the stepwise regression, a new model statement was created. The results of this regression model were analyzed using alpha = .05 level of significance. The results are presented in Table 3.

Table 3

Summary of Stepwise Regression Analysis Using Variables of MAPSREAD, AGE, and MAPSLANG as Predictors of GRADES

Independent Variable	Multiple R^2	Increase in Multiple R^2	P(2Tail)
MAPSRead	0.191	0.191	0.076
AGE	0.259	0.068	0.005**
MAPSLang	0.289	0.030	0.055*

Key: Alpha = .150 to Enter and .150 to Remove
*p<.05
**p<.001

Reestimating the model indicated that 28.9% of the variance of the English grades is accounted for by MAPSREAD, AGE, and MAPSLANG; however, using a more strict level of significance

(alpha = .05) MAPSREAD dropped out. Although this variable dropped out under the more stringent alpha level, it accounted for 19.1% of the variance of the criterion variable and had a moderate correlation (r = 0.437) with the English grades when the Pearson was calculated. Even though it cannot be considered as a significant predictor at the .05 level of significance, it should be considered when this study is replicated.

AGE is significant at the .01 alpha level and accounts for 6.8% of the variance of the criterion variable in combination with the MAPS Reading scores. MAPSLANG is significant at the .05 alpha level although it accounts for only 3% of the variance of the English grades in combination with MAPSREAD and AGE.

Questions 2-8

Pearson product-moment correlations were calculated to determine if associations exist between the variables of Language subtest scores of the Career Planning Program Test (CPPLANG), Reading subtest of the Career Planning Program Test (CPPREAD), Language subtest scores of the Multiple Assessment and Program Services Test (MAPSLANG), Reading subtest scores of the Multiple Assessment and Program Services Test (MAPSREAD), the age of the student on the last day of the course in which the English grade was received (AGE), whether the student was male or female (GENDER), and the ethnic group with which the students identified, White or Non-white (RACE). The results of the correlations are presented in Table 4.

These results revealed that a moderate to strong correlation did exist among the subtests on the two standardized tests. All of these subtest predictors had a positive correlation with the criterion variable. Of the attribute variables, AGE and GENDER have a positive correlation with the criterion variable; both have some association with the MAPS subtests. Only CPPREAD has a positive correlation with RACE.

Table 4

Pearson Correlation Matrix

	GRADE	CPPLANG	CPPREAD	MAPSLANG	MAPSREAD
GRADE	1.000				
CPPLANG	0.236*	1.000			
CPPREAD	0.274**	0.481**	1.000		
MAPSLANG	0.424**	0.526**	0.538**	1.000	
MAPSREAD	0.437**	0.439**	0.549**	0.619**	1.000
AGE	0.409**	0.095	0.108	0.306**	0.384**
RACE	0.060	0.129	0.217*	0.193	0.093
GENDER	0.239*	0.170	0.056	0.124	0.242*

	AGE	RACE	GENDER
AGE	1.000		
RACE	-0.098	1.000	
GENDER	0.220*	0.016	1.000

*p<.05
**p<.01 Number of observations: 104

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Question 2

Is there a significant relationship between first-quarter English course grades and Language scores on the CPP test? Results of the correlations revealed that the Language scores on the CPP had a positive correlation with the students' English course grades, r (102) = .236, p<.05. Those students scoring higher on the CPPLANG were also awarded a higher grade in their entry-level English course.

There was also a significant relationship between the CPP Language Subtest scores and the scores of the subtests on both standardized tests. The students who made higher scores on the CPPLANG also made higher scores on the MAPSLANG r (102) = .526, p<.01. CPPLANG also had a positive correlation with the scores of the two Reading subtests: MAPSREAD, r (102) = .439, p<.01 and a slightly higher positive correlation with CPPREAD, r (102) = .481, p<.01. Those students scoring higher on the CPPLANG also scored higher on these two subtests.

Question 3

Is there a significant relationship between first-quarter English course grades and Reading scores on the CPP test? Results of the correlations revealed that the Reading scores on the CPP had a positive correlation with the students' English course grades, r (102) = .274, p<.01. Those students scoring higher on the CPPREAD were also awarded a higher grade in their entry-level English course.

The Reading scores on the CPP also had a strong positive correlation with the other subtest scores: MAPSREAD, r (102) = .549, $p<.01$; CPPLANG, r (102) = .481, $p<.01$; MAPSLANG, r (102) = .538, $p<.01$. Additionally, the CPP Reading scores had a positive correlation with RACE. Those students scoring higher on the CPP Reading subtest were White.

Question 4

Is there a significant relationship between first-quarter English course grades and Language scores on the MAPS test? Correlations revealed that the Language scores on the CPP had a positive correlation with the students' English course grades, r (102) = .424, $p<.01$. Those students scoring higher on the MAPSLANG achieved higher grades in their entry-level English course. The multiple regression stepwise analysis identified MAPSLANG as a predictor of the English grades; it was included with MAPSREAD and AGE in a new model statement. The MAPS Language scores also had a strong positive correlation with the other subtest scores: MAPSREAD, r (102) = .619, $p<.01$; CPPLANG, r (102) = .439, $p<.01$; CPPREAD, r (102) = .538, $p<.01$. Additionally, the MAPS Language scores had a positive correlation with AGE. The older students achieved higher scores on these two subtests.

Question 5

Is there a significant relationship between first-quarter English course grades and Reading scores on the MAPS test? Results of the correlations revealed that the Reading scores on

the MAPS had a positive correlation with the students' English course grades, r (102) = .437, p<.01. Those students scoring higher on the MAPSREAD were also awarded a higher grade in their entry-level English course. The multiple regression stepwise analysis identified MAPSREAD as a predictor of the English grades and accounting for 19.1% of the variance of GRADE, R^2 = .191.

There was also a significant relationship between the MAPS Reading Subtest scores and the scores of the subtests on both standardized tests. The students who made higher scores on the MAPSREAD also made higher scores on the CPPREAD r (102) = .549, p<.01. MAPSREAD also had a positive correlation with the scores of the two Language subtests: CPPLANG, r (102) = .439, p<.01 and a considerably stronger correlation with MAPSLANG, r (102) = .619, p<.01. Those students scoring higher on the MAPSREAD scored relatively higher on the two CPP tests and had an even stronger performance on the CPPLANG.

Like MAPSLANG the MAPS Reading scores had a positive correlation with AGE. Those students scores on the MAPS Reading subtest correlated positively with their age, r = .384, p<.01. Additionally, there was a low correlation with GENDER, r = .242, p<.05.

Question 6

Is there a significant relationship between first-quarter English course grades and the student's age? The correlations revealed that there is a significant relationship between GRADES and the age of the students, r (102) = .409, p<.01. The higher

the grades which were awarded to the students correlated to the increase in age of the students receiving the grades. Age had a significant relationship with both of the MAPS subtest scores: MAPSLANG, r (102) = .306, p<.01; and MAPSREAD had a slightly higher correlation, r (102) = .384, p<.01. Additionally, AGE had a positive relationship with GENDER, r (102) = .220, p<.05; there are more older men than women students in the study.

Question 7

Is there a significant relationship between first-quarter English course grades and the student's gender? The results of the correlations indicates that the higher the grade awarded to a student the more likely that grade will be awarded to a male, r (102) = .239, p<.05. GENDER also has a significant correlation with MAPSREAD, r (102) = .242, p<.05, indicating that more males performed better on the MAPS Reading subtest than did the females.

Question 8

Is there a significant relationship between first-quarter English course grades and the student's race? The correlation results revealed that race had no significant relationship with the students' grades, r (102) = .060. In other words, the ethnic affiliation of the students had no influence on the grades they received in the entry-level English course. RACE had a significant relationship with one of the subtest, CPPREAD, r (102) = .217, p<.05., indicating that White students scored higher on the CPP Reading subtest than Non-white students.

Summary

This chapter has presented the statistical analyses of the eight research questions examined in this study. Results are synopsized below.

A stepwise regression analysis identified three significant predictor variables: MAPS Reading scores, Age, and MAPS Language scores. CPP Reading scores, CPP Language scores, gender, and race were not statistically significant in predicting students' grades in an entry-level English course and were eliminated as predictors. The regression analysis indicated that 28.9% of the variance of the first-quarter English grades is attributable to MAPS Reading scores, Age, and MAPS Language scores.

The three predictor variables were entered into a new model statement and reestimated at a more strict level of significance. Although the scores on the MAPS Reading Subtest were not significant at the .05 alpha level, they accounted for 19.1% of the variance of the criterion variable. In combination with the scores on the MAPS Reading subtest, Age and the MAPS Language scores accounted for 6.8% and 3.0%, respectively, of the variance of the entry-level English grade.

The Pearson product-moment correlation identified significant relationships among the eight variables. There was a significant positive correlation between the students' grades in an entry-level English course and all of the subtests, age, and gender.

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Results indicate that there was a significant positive relationship between all of the subtests. Age, which had a significant relationship with the students' grades, also had a significant relationship with the MAPS Reading and MAPS Language Subtests. Age had no relationship with the two CPP subtests. Gender had a significant relationship with the students' grades and with the MAPS Reading Subtest. Correlations suggest that RACE had a significant relationship with the CPP Reading Subtest.

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Discussion and Conclusions

This chapter summarizes the statistical analyses which were reported in Chapter IV and offers conclusions which can be drawn from the statistical results. Implications and recommendations for future research conclude this chapter.

Research Questions

This study identified research questions which addressed the problem of effective admissions criterion. These eight research questions were the basis for the analysis and discussion of this study:

(1) What is the best set of predictors of students' grades in a first-quarter English course, given the independent variables of CPP Reading and Language scores, MAPS Reading and language scores, age, race, and gender?

(2) Is there a significant relationship between first-quarter English course grades and Language scores on the CPP test?

(3) Is there a significant relationship between first-quarter English course grades and Reading scores on the CPP test?

(4) Is there a significant relationship between first-quarter English course grades and Language scores on the MAPS test?

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(5) Is there a significant relationship between first-quarter English course grades and Reading scores on the MAPS test?

(6) Is there a significant relationship between first-quarter English course grades and the student's age?

(7) Is there a significant relationship between first-quarter English course grades and the student's gender?

(8) Is there a significant relationship between first-quarter English course grades and the student's race?

Response to Research Question 1

This study found that the MAPS Reading and Language subtests and student age were predictors of grades in an entry-level English course. All students enrolling in a program of study at the institution where the data were collected were required to take an entry-level English course. Since the course grades, the criterion variable in this study, were a requirement for completing the basic curriculum, these results can impact the placement policy of the institution and can give the counselors/advisors information which can better the students' chances of making higher grades.

The findings that the MAPS Reading and Language subtest scores were predictors of student grades in an entry-level English course supports research conducted by the College Board (1988) which also reported the reliability coefficient for the Reading Comprehension subtest to be r = .88. A study conducted by Maricopa County Community College District in Phoenix,

Arizona, found the MAPS Reading subtest to have a high internal consistency estimate of reliability ($\underline{r}$ = .91) but a low predictive validity coefficient ($\underline{r}$ = -.15 to .34); therefore, the district selected another test (Abbott, 1986). On the other hand, an ad hoc committee reporting to the Tennessee Board of Regents confirmed the use of MAPS subtests after setting placement scores based upon MAPS high degree of predictive validity (Nicks, 1985).

The MAPS subtests offer counselors a basis for predicting whether students will be successful in an English course by using the students' MAPS scores. Providing institutions with information to help in the placement of first-time-in-college students, these MAPS test results are best applied when the tests' cut-off scores are normed locally and checked on a periodic basis (NJBSC, 1988; Einspruch, 1988).

The failure of the CPP Reading and Language subtests to emerge from the stepwise regression as predictors of entry-level English course grades was not unexpected. In a study conducted at a two-year technical college in South Carolina, a statistical comparison was conducted using the CPP test, the SAT, and a proposed in-house test. The lowest correlation was the CPP test which reemphasized that it is less likely to assist a counselor in advising prospective students of the courses in which they could likely make a passing grade (Grulick, 1986).

Age was a significant predictor at the .01 level of significance and, in combination with scores on the MAPS Reading

subtest, accounted for 6.8% (R^2 = .259) of the variance of the entry-level English grades. Acknowledging that age can be a predictor of student grades, counselors may look at a student's age, maturity, and relative knowledge when developing a schedule of courses. Many older students have learned from life's experiences, and their work experience and maturity give them the focus and dedication to successfully complete a course or a program of study. Counselors in technical and community colleges may find this helpful since more than 50% of the students enrolled in most two-year colleges are older than their counterparts at traditional four-year colleges and universities (Hughes, 1991).

Response to Research Questions 2-5

Research questions 2-5 address the relationships of the four subtest variables and the criterion variable. The findings suggest that some associations did exist between the variables.

A significant positive relationship was found between the Language and Reading scores on the CPP and the students' grades on an entry-level English course. The CPP subtests were especially constructed and normed to help students who are entering community and technical colleges or vocational training programs to use information about their aptitudes, interests, and grades (Healy, 1973). Although these two CPP subtests were not determined to be predictors of the English course grades in this study, the American College Testing Program's design of the test suggests it to be able to determine if a student has a low,

medium, or high chance of making a grade of C or higher in up to twenty-five training programs (Healy, 1973).

Analysis also revealed a significant positive correlation between the students' scores on the MAPS Reading and Language subtests and their grades on an entry-level English course. These relationships support the validity studies conducted by the College Board (1980; 1985; 1986; 1987a; 1987b; 1988a) which suggest that these subtests are predictors of students' grades.

Contrary to this positive image, only one of these validity studies conducted by the College Board used student grades as the criterion variable in the study (The College Board, 1986). The subtests used were Reading, Writing, and Computation. The sample population of 307 was tested, and the validity coefficient for the Reading subtest was weak (r = .29). One of the studies used grade point average as the criterion variable; three other studies developed validity coefficients for an alternate test (Form B) to be used in follow-up to Form A. No validity studies have been published since the introduction of Form C as a part of the MAPS umbrella in 1988.

The College Board suggests that other predictive variables should be used in an admissions formula along with the results of the MAPS subtests for more accurate individualized student placement into remedial, developmental, or college courses. The College Board (1986) explains that the function of the MAPS subtests is to provide schools with an analysis between the

students' preadmission tests scores and their college course grades.

A positive relationship exists between the two MAPS subtests and the age of the students taking the tests. In other words, the older students make high or higher grades on the two subtests.

Response to Research Questions 6-8

Research questions 6-8 address the relationships of the three attribute variables of age, gender, and race and the criterion variable. The findings suggest that some associations did exist between the variables.

A significant positive relationship was found between the age of the students taking the entry-level English course and the grades which they were awarded in the course. This means, in general, that there is a tendency for the older students to receive higher grades and the younger students to receive lower grades. This could suggest that the older students, who are more realistic and responsible, are more likely to achieve more consistently than their younger counterparts (Donsky, 1981). Since the data for this study were collected over a four quarter time period and included multiple faculty members, it is assumed that these results are not teacher biased.

Age also had a significant positive correlation with both of the MAPS subtests. Student scores on the two subtests tended to correlate with their age. That is, as the age of the students increased, so did their scores on the MAPS Reading and Language

subtests. This is good news to those researchers who have been fighting the age bias of standardized tests for the last two decades. Some standardized tests, like the ACT, have been attacked for a negative age bias (Aldag & Rose, 1983). Surprisingly, Aldag and Rose discovered that age had a positive correlation with student performance on the Nursing State Board examinations. The problem with a scenario like this one is that the students are predicted to perform well in a program of study for which they cannot pass the admissions examination.

It is also plausible that the positive correlation may stem from the procedures used to norm the subtests. The norms for many nationally used tests are based on the scores of younger students (Haywood & Hoffman, 1975). The College Board (1986) conducted nation-wide testing at various schools, including two-year technical and community colleges, four-year colleges, and universities. Even though only a few of the criterion variables used in these studies were actual course grades, the College Board's choice of technical and community college populations may have contributed to an age sensitive instrument.

The correlation between age and the subtests was significant and positive. This does not mean that all older students made higher test scores or that all younger students made lower test scores, but a significant ($p<.01$), positive correlation for both Reading ($r = .384$) and Language ($r = .306$) suggests an identifiable tendency in that direction. These findings are, however, contrary to those of the New Jersey Basic Skills Council

(NJBSC) (1988b) which determined that students who were recent graduates from high school made higher scores than those students who had been out of school longer.

In institutions where the mean student age is greater than 25, this study supports taking the age and experience of the applicants into consideration in addition to their MAPS Reading and Language scores before advisement. In this way, the older students may gain the opportunity to demonstrate a responsible attitude by achieving consistently (Donsky, 1981).

Correlations indicated a significant positive association between the gender of the students and their grades in an entry-level English course. This significant, but low, correlation suggests that males made more high grades or higher grades than the females in the sample population. Since the statistical program used in this study adjusts for differences in group sizes, this relationship is not due to the disproportionate numbers of males to females (67 to 37 respectively) in the sample population. The difference in the ages of the males and females, however, may contribute to this statistic. The females tested in the study had a lower mean age (23.1) than the mean age for the sample population (25.8). The mean age for the men was 28.5. This study and others have concluded that age can be a significant predictor of student achievement or course grades (Aldag & Rose, 1983; Donsky, 1981; NJBSC, 1988b). The age delineation also contributes to this study's findings that age may play a significant role in grade achievement and that the

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older students are more committed to their educational goal and have more practical experience (Donsky, 1981). Any remaining differences between the behavior of the males and females may be the result of cultural forces or simple differences between their interests and/or abilities (Scott, Fenske, and Maxey, 1974).

The students' ethnic affiliations had no statistically significant relationship with the entry-level English course grades. It did, however, have a weak positive correlation with the CPP Reading subtest (r = .217; p<.05). Because race had no significant correlation with any of the other nationally standardized subtests or either of the other attribute variables, this correlation may be caused by external or sampling influences. Because non-white students composed only 5% of the sample population, the impact of race on the one subtest may have been skewed.

The ethnic affiliation of students should not, however, be ignored. The trends in population changes point to a more diversified, multicultural society in the twenty-first century. During the 1990s alone, legal immigration will grow by 100,000 per year, new multicultural groups will develop, and the fertility rate for minorities will increase by more than twenty births per thousand over non-Hispanic whites (Riche, 1991).

Martha Farnsworth Riche (1991), Director of Policy Studies at the Population Reference Bureau in Washington D.C., says that the way for these minorities to "gain broader opportunities in American society" is through a college education; however, black

college enrollment rates are declining and the poorly educated young black men are already "shut out of a broader society" (p. 32). The United States has accomplished little in segregating the nation's inner cities, residential neighborhoods, or education; it continues to move toward two nations, one White and one Black, that are "separate and unequal" (Gillmor & Doig, 1992, p. 51). In the mean time, the strength of the Asian population growth can be measured by their number of successful businesses and their educational accomplishments (O'Hare, 1992).

Although the ethnic affiliation in this population sample had no strong significant relationships with the criterion variable or other independent variables in this study, race should be included in future studies to help counselors advise multicultural college applicants. For the security of the American society in the twenty-first century, progress in desegregation has to be made so that all college applicants and potential employees can take advantage of business opportunities and be included in America's broader society.

Implications

In order to place applicants into an appropriate program or course, most colleges and universities rely on admissions or placement testing. The rationale for this study was based on the limited success with testing described in the literature and the changes in the nation's economy, multicultural groups, educational reforms, and training needs that will put tremendous demands on America's postsecondary education systems. Results of

this study have implications for the admissions, placement, and counseling processes that postsecondary institutions and systems will use.

Because admissions testing alone does not adequately predict student success in a course or a program of study, education institutions constantly look for a better system. This recurring scenario points out the need for a procedure by which students can be placed into a program of study in which they have the ability to be successful. The selection of an instrument to test student ability is important. More importantly, however, colleges should develop a formula or a procedure, of which testing is one part, for advising students in the appropriate courses, for training/ retraining classes, or for a program of study leading to a degree.

Constant evaluation and testing of a placement formula are needed because most population needs are different and continue to change. The growth of multicultural populations creates different minority groupings like the black male youth and young black adult. Gender based minorities develop like single pregnant women and single mothers. New and changing ethnic affiliations are created like the Black Asian American, Black Hispanic American, or the Russian Jew. Some of the U.S. urban areas have a high cost of living and growing minority populations which are pushing them farther away from the national norms and do not reflect what businesses call an average American marketplace (Waldrop, 1992). If the United States plans to play

a major role in the world economy, its changing jobs will need a means of retraining the labor force which is quickly becoming a majority of multicultural populations.

The programs that a technical or community college offers will have tremendous impact on the community. If the institution has cooperated with industry, it will design training programs to produce the educated and skilled employees they need. The training process will contribute to the individual's financial stability, business and industry's viability in the world market, and the United States' success in a global economy. The procedure that the institutions use to place the students into a program can have one of two different effects on the applicants: (1) If the procedure is accurate and composed of a set of predictors, it can expedite the training process and allow the graduates to make a contribution to the community; (2) If the procedure is strictly an admissions test, a procedure with poor predictors, or ill applied, it can refuse admission to a potentially successful applicant or admit an applicant to a program of study who is doomed for failure.

Suggestions for Future Research

The results of this study suggest potential directions for future research. The data for this study were collected over a period of one year at a postsecondary institution in the Metropolitan Atlanta area. The institution is located in an area that was one of the fastest growing communities in the decade of the 1980s, is the location of most of Georgia's high tech

industries, and is predicted to continue its growth and changes during the next fifteen years.

One recommendation is that this study be replicated using several institutions with different age, gender, and racial ratios that would identify different relationships between the attribute variables and the scores on the different tests. Because the racial makeup of this study's population sample was less than 5% Non-white, the empirical implications in this study were inconclusive. Using these attribute variables in a replicated study would produce a good basis for comparison and contribute to a more reliable admission procedure. Using different populations across the country would give more credence to the predictive validity of the tests without relying on the developer and distributer of the tests to conduct the research and publish their conclusive results.

Although the predictors identified in this study accounted for nearly 30% (R^2 = .289) of the variance in the course grades, a larger portion of the variance remains unaccounted for. When this study is replicated, other predictors may be analyzed for inclusion in the list of variables used for placing students into an entry-level English course. The College Board (1980) proposed that all institutions should have an admissions process which included local data whether the students were being placed into a program of study or into a single course. Additionally, other data should be utilized along with test data for test validity studies (The College Board, 1985). The test scores should be

shared with the students and should be used in guidance counseling and course selection.

Future replications of this study should employ different tests as predictors of student grades in entry-level courses. Although CPP and MAPS are the placement tests identified by American College Testing Program and the College Board for studies like this one, other tests such as the ASSET, Scholastic Aptitude Test (SAT), and computerized testing should be used. In addition to the need for improved communication skills, the growing use of computers and computerized equipment would make entry-level mathematics courses an excellent criterion variable for a study like this one.

The inclusion of attribute variables are important in any replication of this study. The aging of America will see the baby boomers move into retirement, will see a higher percentage of minorities in the population and in the workforce, and will see a growing number of women in all levels of business. The three variables of age, race, and gender will help identify the changing populations and the impacts that their training or lack of training will have on the United States economy in the future.

Predictive research has limitless possibilities in the predictor variables that can be used in admissions and placement processes. Although the testing services develop, test, and provide these placement tests for institutions to use, there is a lack of empirical research on the predictors of course grades, especially for the technical and community college populations.

Attribute variables will play an important role in future changes in the population and in the changing identity of the American workforce. It is important, therefore, to analyze these factors in the placement of students into training programs and courses. It is also important to avoid misusing data. Some clinical analysts use this data to support hunches or more personal qualitative evaluations. Unless the success frequency of the clinician's hunches have been studied, the statistician is well advised to ignore the findings (Meehl, 1963). New research efforts are needed to measure the changes in this growing population because its composition will also be the makeup of the employees of business and industry in the future.

Assumptions and Limitations

The findings of this research are limited to the students enrolled in entry-level English courses who participated in this study. All of the subjects attended the same technical institution in the same metropolitan area. This study was also limited by the small size and composition of the group.

The courses were taught by qualified English faculty with college teaching experience. They all agreed on the level of performance on which grades were awarded, and it is assumed that the grades were awarded fairly. Instituting and consistently using departmental tests would improve their reliability.

This study was also limited by the standardized subtests used to assess student ability. Although the CPP and MAPS subtests have been tested for reliability and validity, they use

different approaches to information collection and different scales for disseminating their predictive scores.

Summary

This study endeavored to identify a set of predictors which would assist in the appropriate and efficient placement of students enrolling in a course or a program of study. Using the course grade as the criterion variable, seven predictor variables were used in the regression analysis: CPP Reading and Language subtests, MAPS Reading and Language subtests, age, gender, and race. Data were collected on the participating sample population during the 1989 calendar year.

The findings suggest that scores on the MAPS Reading and Language subtests and student age are a useful set of predictors which accounts for 28.9% of the variance of student entry-level English grades. There was a positive significant correlation between the MAPS Reading and Language subtests and the age of the student. The older students achieved higher scores on these two subtests.

The findings of the study suggest that future research examine additional course grades like mathematics, interpersonal skills, and other communication courses. Additional standardized placement and admissions tests should be used as predictor variables when the study is replicated. Standardized test scores, which are used as a part of a procedure for placement into a particular course or program, are better predictors of success when used with other predictor variables (Halpin, Halpin,

& Schaer, 1981; Rounds & Andersen, 1985; Schaffner, 1985). All admissions procedures or placement formulas should be reevaluated periodically to confirm and/or identify significant predictor variables.

This study was an attempt to examine two widely used placement tests on the same population to determine if the student scores on their Reading and Language subtests could be used as predictors of the students' grades in the course. Adding the attribute variables allowed the analysis to consider the characteristics of the population along with the scores on the subtest. Hopefully, the results of this study have provided insight into current placement criteria and have suggested areas for future research which will improve the criteria.

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